

CLAIMS

What is claimed is:

1. A method of transfecting a cell, comprising:

a) providing:

i) a transfection complex immobilized on a surface, said complex comprising nucleic acid and first and second complexing agents, said first complexing agent comprising a ligand for a receptor, said second complexing agent comprising a DNA binding molecule, and

ii) a cell; and

b) contacting the cell with the nucleic acid in the transfection complex under conditions such that the cell is transfected.

2. The method of Claim 1, wherein the transfection complex further comprises a third complexing agent, said third complexing agent comprising a membrane permeable molecule.

3. The method of Claim 2, wherein the DNA-binding molecule is a cationic protein.

4. The method of Claim 2, wherein the membrane permeable molecule is a cationic lipid.

5. The method of Claim 3, wherein the ligand is covalently linked to the cationic protein.

6. The method of Claim 5, wherein the transfection complex further comprises one or more cationic lipids.

7. The method of Claim 6, wherein the ligand is transferrin and the cationic protein is polylysine.

8. The method of Claim 2, wherein the transfection complex further comprises one or more additional complexing agents selected from the group consisting of targeting molecules, transcription molecules, nucleic acid degradation inhibitors, cell growth and integrity modulators, and mixtures thereof.

9. The method of Claim 1, further comprising the step of expressing the nucleic acid in the transfected cell.

10. The method of Claim 9, further comprising the step of detecting the expression of the nucleic acid in the transfected cell.

11. A method of transfecting a cell, comprising

a) immobilizing a transfection complex on a surface, said complex comprising nucleic acid and first and second complexing agents, said first complexing agent comprising a ligand for a receptor, said second complexing agent comprising a DNA binding molecule; and

b) contacting the cell with the immobilized nucleic acid in the transfection complex under conditions sufficient to transfect the cell.

12. A method of transfecting a cell, comprising:

a) combining nucleic acid with first and second complexing agents, said first complexing agent comprising a ligand for a receptor and said second complexing agent comprising a DNA binding molecule, so as to form at least one transfection complex comprising nucleic acid and said first and second complexing agent;

- b) immobilizing said transfection complex on a surface so as to form immobilized nucleic acid; and
- d) contacting said cell with said immobilized nucleic acid in said transfection complex under conditions such that said cell is transfected.

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13. A method of transfecting a cell, comprising:

- a) covalently linking transferrin to polylysine to form a transferrin-polylysine complex;
- b) combining nucleic acid and a cationic lipid with said covalently linked transferrin-polylysine complex to form at least one transfection complex;
- c) immobilizing said transfection complex on a surface so as to form immobilized nucleic acid;
- d) contacting said cell with said immobilized nucleic acid in said transfection complex under conditions such that said cell is transfected.

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14. A method of immobilizing nucleic acid to a surface which comprises:

- a) combining said nucleic acid with first and second complexing agents, said first complexing agent comprising a ligand for a receptor, said second complexing agent comprising a DNA binding molecule, so as to form at least one transfection complex comprising said nucleic acid and said first and second complexing agent; and
- b) contacting the at least one transfection complex with a surface under conditions sufficient to immobilize said nucleic acid in said transfection complex.

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15. The method of Claim 14, wherein said transfection complex further comprises a third complexing agent, said third complexing agent comprising a membrane permeable molecule.

16. The method of Claim 15, wherein the DNA-binding molecule comprises a cationic protein.

17. The method of Claim 15, wherein the membrane permeable molecule comprises a cationic lipid.

18. The method of Claim 16, wherein the ligand is covalently linked to the cationic protein.

19. The method of Claim 18, wherein the ligand is transferrin and the cationic protein is polylysine.

20. The method of Claim 19, wherein the transfection complex further comprises a cationic lipid.

21. The method of Claim 15, wherein the transfection complex further comprises at least one additional complexing agent selected from the group consisting of targeting molecules, transcription molecules, nucleic acid degradation inhibitors, cell growth and integrity modulators, and mixtures thereof.

22. The method of Claim 15, wherein more than one transfection complex is formed, and the immobilized transfection complexes form an array.

23. An array comprising transfection complexes immobilized on a surface, said complexes comprising nucleic acid and first and second complexing agents, said first complexing agent comprising a ligand for a receptor, and said second complexing agent comprising a DNA binding molecule.

24. The array of Claim 23, wherein at least one of the transfection complexes further comprises a third complexing agent, said third complexing agent comprising a membrane permeable molecule.

5 25. A transfection complex comprising nucleic acid and first and second complexing agents, said first complexing agent comprising a ligand for a receptor and said second complexing agent comprising a DNA binding molecule.

10 26. The transfection complex of Claim 25, further comprising a third complexing agent, said third complexing agent comprising a membrane permeable molecule.

27. The transfection complex of Claim 25, wherein the DNA-binding molecule is a cationic protein.

15 28. The transfection complex of Claim 27, wherein the membrane permeable molecule is a cationic lipid.

20 29. The transfection complex of Claim 27, wherein the ligand is covalently linked to the cationic protein.

30. The transfection complex of Claim 29, wherein the ligand is transferrin and the cationic protein is polylysine.

25 31. The transfection complex of claim 29 further comprising one or more cationic lipids.

32. The transfection complex of Claim 26, further comprising at least one additional complexing agent selected from the group consisting of targeting molecules, transcription

molecules, nucleic acid degradation inhibitors, cell growth and integrity modulators, and mixtures thereof.

33. The transfection complex of Claim 26 immobilized to a surface.

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34. A method of identifying a ligand of a receptor protein comprising:

a) providing:

i) a transfection complex immobilized on a surface, said complex comprising first and second nucleic acids and first and second complexing agents, said first nucleic acid encoding a receptor and said second nucleic acid encoding a protein, wherein said first and second nucleic acid are present in at least one expression vector, and said first complexing agent comprising a ligand for a receptor, and said second complexing agent comprising a DNA binding molecule, and

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ii) a cell; and

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b) contacting the cell with said complex under conditions such that the cell is co-transfected with the nucleic acids and the nucleic acids are expressed; and

c) detecting the presence of a ligand-receptor binding pair, wherein the receptor protein is encoded by said first nucleic acid.

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35. The method of claim 34, wherein said receptor protein is selected from the group consisting of G-protein coupled receptors and receptor kinases.

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36. The method of claim 34, wherein the immobilized nucleic acid form an array.

37. A method of transfecting a cell, comprising:

a) providing:

i) a transfection complex immobilized on a surface, said complex comprising nucleic acid and first and second complexing agents, said first complexing agent comprising a ligand for a receptor, said second complexing agent comprising a DNA binding molecule, and

5 ii) a cell; and

b) contacting the cell with the immobilized transfection complex on the surface under conditions such that cells are transfected using an active transport process.

38. A transfection complex comprising a nucleic acid, a cationic lipid, a ligand for a receptor and a DNA binding protein, wherein the ligand is a viral protein and wherein the viral protein is covalently bound to the DNA binding protein.

39. The transfection complex of Claim 38, wherein the viral protein is selected from the group consisting of penton protein, HIV protein GP120, equine rhinitis A virus protein VP1, human adenovirus protein E3, and Epstein-Barr virus protein GP350.

40. The transfection complex of Claim 38, wherein the viral protein is penton protein.

41. The transfection complex of Claim 38, wherein the DNA-binding protein is selected from the group consisting of polylysine and a histone.

42. The transfection complex of claim 38, wherein the cationic lipid is lipofectamine.